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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/834,365	TANIGUCHI ET AL.	
	Examiner	Art Unit	
	Hussein Akhavannik	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-26 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-26 is/are rejected.

7)☒ Claim(s) 1,2,9,10,13-16,22 and 24 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 13 April 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 5.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because it is two paragraphs rather than one paragraph. Correction is required. See MPEP § 608.01(b).

2. The disclosure is objected to because of the following informalities:

On page 9, line 16, "wb hb" should be changed to "wb * hb".

On page 9, line 16, "8 8" should be changed to "8 * 8".

On page 9, line 26, the symbols (such as <, >, /, *) between "1 h" and "h g" are missing and should be added.

On page 9, line 28, the symbols (such as <, >, /, *) between "h g" and "g x" are missing and should be added.

On page 10, line 3, "m 2" should be changed to "m = 2".

On page 10, line 5, the symbols (such as <, >, /, *) between "Pha g" and "g Phb" are missing and should be added.

On page 11, line 29, the symbols (such as <, >, /, *) between "0 1" and "1 n" are missing and should be added.

On page 15, line 2, the second occurrence of "D1" should be changed to "Dn".

On page 15, line 17, the second occurrence of "D1" should be changed to "Dn".

On page 18, line 23, the symbols (such as <, >, /, *) between "1 i" and "i s" are missing and should be added.

On page 18, line 23, the symbols (such as <, >, /, *) between "1 j" and "j t" are missing and should be added.

On page 18, line 24, the symbols (such as <, >, /, *) between "s t" are missing and should be added.

On page 19, line 20, the symbols (such as <, >, /, *) between "1 h" and "h g" are missing and should be added.

On page 19, line 24, "m 2" should be changed to "m = 2".

On page 20, line 18, the symbols (such as <, >, /, *) between "1 h" and "h g" are missing and should be added.

On page 20, line 25, the symbols (such as <, >, /, *) between "Pb g" and "g Pq" are missing and should be added.

On page 20, line 25, the symbols (such as <, >, /, *) between "p q" are missing and should be added.

On page 20, line 25, the symbols (such as <, >, /, *) between "1 p" are missing and should be added.

On page 20, line 25, the symbols (such as <, >, /, *) between "q m" are missing and should be added.

On page 21, line 9, the symbols (such as <, >, /, *) between "Pha g" and "g Phb" are missing and should be added.

On page 23, line 1, the symbols (such as <, >, /, *) between "1 k" and "k n" are missing and should be added.

On page 23, line 1, the symbols (such as <, >, /, *) between "1 u" and "u hb" and "hb wb" are missing and should be added.

On page 23, line 29, the second occurrence of "D1" should be changed to "Dn".

On page 24, line 2, the second occurrence of "P```hij1" should be changed to "P```hijn".

On page 24, line 4, the second occurrence of "P```hij1" should be changed to "P```hijn".

On page 25, line 7, the symbols (such as <, >, /, *) between "0 e" are missing and should be added.

On page 25, line 13, the symbols (such as <, >, /, *) between "1 k" and "k n" are missing and should be added.

On page 25, lines 17-18, the symbols (such as <, >, /, *) between "1 k" and "k n" are missing and should be added.

On page 25, line 23, the symbols (such as <, >, /, *) between "0 1" and "1 n" are missing and should be added.

On page 25, line 29, the symbols (such as <, >, /, *) between "1 k" and "k n" are missing and should be added.

On page 27, line 4, the second occurrence of "D1" should be changed to "Dn".

On page 30, line 29, the symbols (such as <, >, /, *) between "1 k" and "k n" are missing and should be added.

On page 31, line 29, the second occurrence of "D1" should be changed to "Dn".

Appropriate correction is required.

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

4. A substitute specification in proper idiomatic English and in compliance with 37 CFR 1.52(a) and (b) is required. The substitute specification filed must be accompanied by a statement that it contains no new matter.

Claim Objections

5. Claims 1-2, 9-10, 13-16, 22, and 24 are objected to because of the following informalities:

In claims 1 and 13, line 9, "data being detected;" should be changed to "data is detected;".

In claim 15 , line 10, "data being detected;" should be changed to "data is detected;".

In claims 2 and 14, lines 8-9, "data being detected;" should be changed to "data is detected;".

In claim 16, lines 9-10, "data being detected;" should be changed to "data is detected;".

In claims 9 and 22, line 11, "additional pattern embedded" should be changed to "additional pattern is embedded".

In claims 10 and 24, line 2, "more of groups," should be changed to "more groups,".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 7-9 and 21-23are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Referring to claims 7 and 21, it is not understood what is meant by "a plurality of additional patterns employing the same configuration as said object image data to be added to said object image data". The Applicant should rewrite claims 7 and 21 to clarify these claims or point to where in the specification this subject matter is explained.

Referring to claim 8-9 and 22-23, it is not understood what is meant by "basic patterns".

8. The claims are generally narrative and indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claims 1-3, 12-17, and 26 are rejected under 35 U.S.C. 102(e) as being anticipated by Oami et al (U.S. Patent No. 6,415,041).

Referring to claim 1, which is representative of claims 13 and 15,

i. A variation indication data generation means for generating a plurality of variation indication data indicating variation between the object data and each of the object data obtained by embedding each of the plurality of candidate data is illustrated by Oami et al in figure 5 by the image-quality degradation degree calculation section (203). Oami et al explain in column 11, lines 40-44 that the image-quality degradation degree

calculation section compares the input image (corresponding to the object data) to the watermarked image output (corresponding to the object data obtained by embedding each of the plurality of candidate data) to determine the degradation amount between the two images (corresponding to the variation indication data). Oami et al further explain in column 7, lines 47-58 that multiple watermarks of different strength (corresponding to S(1), S(2) ... S(M)) are each embedded as plurality of candidate data into the input image data.

ii. A detectability indication data generation means for generating a plurality of detectability indication data each indicating how easily each of the plurality of candidate data is detected is illustrated by Oami et al in figure 5 by the detection result output from the digital watermark detection section (202). Oami et al explain in column 11, lines 30-39 that the digital watermark detection section compares the embedded data (corresponding to the candidate data) to the detected watermark (from the watermarked image) to determine the degree to which the watermark has been accurately detected (corresponding to how easily each of the plurality of candidate data is detected). The more accurate the detected watermark, the more easily the watermark can be detected in the system of Oami et al.

iii. A watermark selection means for selecting one of the candidate data based on the plurality of variation indication data and the plurality of detectability indication data is explained by Oami et al in column 7, line 66 to column 8, line 16. Oami et al explain that an optimal watermark strength is determined by the equation for Z(m), which is a function of the image-quality degradation degree D(k,m) and resistance evaluation value

V(k,m). Oami et al illustrate in figure 7 that the resistance evaluation value is a function of the detection result output in figure 5 (which corresponds to the detectability indication data). Once the optimal watermark strength is determined in the system of Oami et al, a watermark of that strength is selected to be embedded into the image data, as explained in column 8, lines 54-56.

iv. A data embedding means for embedding the selected candidate data into the object data as the watermark data is explained by Oami et al in column 8, lines 56-62 and illustrated in figure 3 by the digital watermark insertion section 102.

Referring to claim 2, which is representative of claims 14 and 16,

i. A variation indication data generation means for generating a plurality of variation indication data indicating variation between the image data and each of the image data obtained by embedding each of the plurality of candidate data corresponds to claim 1i, wherein the object data of Oami et al corresponds to image data as illustrated in figure 5 by the input image.

ii. A detectability indication data generation means for generating a plurality of detectability indication data each indicating how easily each of zero or more candidate data is detected corresponds to claim 1ii.

iii. A candidate data selection means, for employing the detectability indication data to select one of the candidate data that corresponds to variation indication data for variations that are smaller than a predetermined reference is explained by Oami et al in column 8, lines 28-32. Oami et al explain that digital watermark strength calculation section (100 in figure 2) checks to ensure that the image-quality degradation degree

D(k,m) (corresponding to the variation indication data) is smaller than a permissible critical value D0 (corresponding to a predetermined reference). The digital watermark strength calculation section determines the optimal watermark strength, corresponding to claim 1iii, if the optimal watermark strength has an image-quality degradation degree D(k,m) smaller than a permissible critical value.

iv. A data embedding means for embedding the selected candidate data as watermark data in the image data corresponds to claim 1iv.

Referring to claim 3, which is representative of claim 17, the detectability indication data generation means generating detectability indication data indicating the detectability of the candidate data corresponding to the variation indication data indicating variations smaller than the predetermined reference is explained by Oami et al in column 11, lines 30-39. Oami et al calculate detectability indication data for all of the watermark strengths, including those that have a variation indication data smaller than a predetermined reference.

Referring to claim 12, which is representative of claim 26, the detectability indication data generation means generating detectability indication data for the respective candidate data corresponding to the variation indication data with their value within a predetermined range is explained by Oami et al in column 11, lines 30-39. Oami et al calculate detectability indication data for all of the watermark strengths, including those that have an image-quality degradation degree (corresponding to variation indication data) between 0 and 1, as explained in column 11, lines 58-63.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 4 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oami et al in view of Zhao et al (U.S. Patent No. 6,141,753).

Referring to claim 4, which is representative of claim 18, the candidate selection means selecting predetermined supplement data, instead of the candidate data, when no candidate data corresponding to the variation indication data for variations smaller than the predetermined reference exist is not explicitly explained by Oami et al. Though Oami et al do determine whether a watermark, at a certain strength, exhibits an image-quality degradation value smaller that D0, corresponding to claim 2, Oami et al do not embed predetermined supplement data if not strengths are smaller than D0. However, Zhao et al explain in column 1, lines 47-51 that visible or invisible watermark may identify the source of a digital work (or image). Identifying the source of a digital work allows the copyright owner of the digital work to determine the pirate who is illegally distributing the digital work as explained by Zhao et al in column 1, lines 26-35. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to embed a predetermined watermark, such as the watermarks 203 and 205(1) illustrated by Zhao et al in figure 2, when no candidate data corresponding to the variation indication data for variations smaller than the predetermined reference exist in the system of Oami

et al because the digital work will always be protected with the presence of a watermark and potential pirates may be identified.

13. Claims 5-8 and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oami et al in view of Ogawa et al (U.S. Patent No. 6,704,431).

Referring to claim 5, which is representative of claim 19,

i. Each of the object image data being each of a plurality of image blocks obtained by dividing one image data set is not explicitly explained by Oami et al. However, Ogawa et al illustrate in figure 2 that digital data contents 103 (corresponding to image data) are divided in block data in step 100.

ii. Each of the watermark data corresponding to each of the object image data is each of one or more type of constituent data constituting additional information that is added to the object image data is not explicitly explained by Oami et al. However, Ogawa et al illustrate in figure 2 that digital watermark data 101 (corresponding to the constituent data constituting additional information) is embedded into the image blocks 109 in step 105.

iii. A watermark data correspondence means for corresponding the constituent data constituting the additional information data with the plurality of image blocks as the watermark data is not explicitly explained by Oami et al. However, Ogawa et al illustrate in figure 2 that coefficients are selected from the block data in step 130 according to key data input in step 12 in order to embed the digital watermark data 12 in step 150. Thus, the key data generated the pseudo-random sequence 125 that corresponds the watermark data (constituent data) with the plurality of image blocks 100.

iv. A candidate data generation means for generating the plurality of candidate data corresponding to the constituent data corresponded with the plurality of image blocks is not explicitly explained by Oami et al. However, Ogawa et al illustrate in figure 2 that original image blocks are replaced with watermarked image blocks in step 180 in order to output watermarked digital contents in step 104.

Oami et al and Ogawa et al are combinable because they are from the same class and subclass and are both related to digital image watermarking. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to divide an image into blocks and to correspond the watermark information with the image blocks. The suggestion/motivation for doing so is explained by Oami et al in column 8, lines 63-66, wherein Oami et al indicate that any watermarking algorithm may be used. Furthermore, watermarking systems using blocks of image information are well-known in the art of watermarking in the frequency domain. Therefore, it would have been obvious to combine Oami et al with Ogawa et al to obtain the invention as specified in claims 5 and 19.

Referring to claim 6, which is representative of claim 20, the watermark data correspondence means accepting predetermined key data to correspond the constituent data of the additional information data with the plurality of image blocks based on the predetermined key data corresponds to claim 5iii, wherein the key data 12 of Ogawa et al is used to correspond the constituent data of the additional information data with the plurality of image blocks.

Referring to claim 7, which is representative of claim 21, the candidate data generation means generating, as the plurality of candidate data, a plurality of additional patterns employing the same configuration as the object image data to be added to the object image data is explained

by Oami et al in column 7, lines 47-57. Oami et al display multiple watermarks (corresponding to constituent data), each exhibiting different watermark strengths. As these watermarks are individually embedded into the object data, a plurality of additional candidate data will be created.

Referring to claim 8, the candidate data generation means generating the plurality of additional patterns by multiplying a plurality of predetermined coefficients with basic patterns corresponding to the constituent data corresponding with the image blocks is explained by Oami et al in column 7, lines 47-57. The basic patterns corresponding to the constituent data corresponded with the image blocks are the digital watermarked images illustrated by Oami et al in figure 5. The predetermined coefficients being multiplied with the basic patterns are the digital watermark strengths, which adjust the watermarks by a predetermined amount, corresponding to the desired watermark strength.

14. Claims 9 and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oami et al in view of Ogawa et al, and further in view of Kita et al (U.S. Patent No. 6,707,927).

Referring to claim 9, which is representative of claim 22,

i. The detectability indication data generation means calculating the detectability indication data representing a correlation between the additional patterns and the basic patterns is explained by Oami et al in column 11, lines 30-39. Oami et al explain a correlation value between 0 to 1, which is calculated by the difference (or correlation) between detected embedded watermark (corresponding to one of the additional patterns) and the digital watermark (corresponding to the basic pattern).

ii. The candidate data selection means selecting, from among the additional patterns, a pattern corresponding to detectability indication data representing the highest correlation is explained by Oami et al in column 7, line 66 to column 8, line 16. The greater the correlation between the embedded watermark and the digital watermark, the greater the detectability value in the table of Oami et al. A high detectability value (or equivalent resistant-evaluation value) have a positive effect (+aV(k,m)) on the selection of the watermark strength. Therefore, the watermark strength chosen in the system of Oami et al exhibits the greatest detectability value.

iii. A watermark data detection means for detecting the watermark data embedded into the image block, based on the correlation of the basic patterns and an image block into which the selected additional pattern is embedded is not explicitly explained by Oami et al or Ogawa et al. However, Kita et al explain in column 2, lines 27-33 that a watermark can be detected by determining the difference between a watermarked image (an image block into which the selected additional pattern is embedded) and an original image (basic pattern). Kita et al explain that this watermark detection method is used in a watermarking system for preventing the degradation of image quality as far as possible in column 2, lines 11-16. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to detect watermark data embedded into image blocks based on a correlation between the basic pattern and an image block into which the selected additional pattern is embedded as explained by Kita et al in the watermarking system of Oami et al and Ogawa et al because both systems are directed towards increasing the imperceptibility of a watermark.

Referring to claim 23, this claim corresponds to claims 8 and 9ii.

15. Claims 10 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oami et al in view of Ogawa et al, and further in view of Hobson et al (U.S. Patent No. 6,633,653).

Referring to claim 10, which is representative of claim 24, the watermark data correspondence means sorting the plurality of image blocks into one or more groups, each of which including one or more of said image blocks to correspond the constituent data with the image blocks that are included in the groups is not explicitly explained by Oami et al or Ogawa et al. However, Hobson et al explain sorting the blocks of an input image into two groups: one group having a variance greater than 50% and the other having a variance less than 50% in column 6, line 62 to column 7, line 4. Hobson et al explain that only the image blocks exhibiting a variance of less than 50% are considered good candidates for watermarking because these blocks have low visibility and high confidence, thereby rendering the watermark imperceptible and robust. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to sort the plurality of image blocks into one or more groups and apply a watermark to only those groups as suggested by Hobson et al in the system of Oami et al and Ogawa et al because the watermark imperceptibility and robustness would be increased.

16. Claims 11 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oami et al in view of Oami (U.S. Patent No. 6,697,499).

Referring to claim 11, which is representative of claim 25, the variation indication data generation means calculating each of the differences between each of the entropy values for the object image data and each of the entropy values for the object image data obtained by embedding each of the plurality of candidate data as the variation indication data is not explicitly

explained by Oami et al. Oami et al explain determining the image-quality degradation amount (corresponding to the variation indication data) by using the PSNR or WSNR or JND values of the watermarked image in column 11, line 40 to column 12, line 5. Oami et al do not explicitly explain determining the difference between the entropy values. However, Oami explains in column 16, line 61 to column 17, line 6 that an entropy value can be determined instead of a JND value in order to characterize the variance of an image. The entropy of an image is well-known in the art to define the activity of the image. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the entropy of an image, as suggested by Oami, instead of the PSNR or WSNR or JND values, as suggested by Oami et al, in order to determine the variance between an original image and a watermarked image because Oami explains that JND values can be substituted by entropy values and entropy is well-known in the art to describe the activity of an image.

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Donescu et al (U.S. Patent No. 6,718,045) – To exhibit an image watermarking method which determines the detectability of an information bit by calculating the correlation between a watermark embedded image and a watermark signal as explained in column 18, lines 60-67.

Iwamura et al (E.P. Patent Application No. 1,041,815 A2) – To exhibit embedding a digital watermark according to the resistance determination as illustrated in figure 6.

Gustafson et al (U.S. Patent No. 6,442,284) – To exhibit determine the characteristics of blocks of a watermarked image in order to extract a watermark from those blocks having certain characteristics as explained in the abstract.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hussein Akhavannik whose telephone number is (703)306-4049. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo H. Boudreau can be reached on (703)305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hussein Akhavannik HA.
April 14, 2004

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